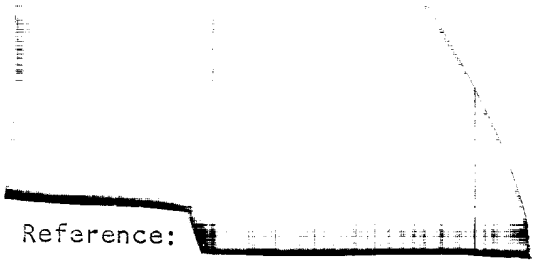
file 9971-3

November 15, 1966
Ref: 456/B66-37



Reference: [redacted] Printer Number 1

STAT Subject: [redacted] Proposal B 66-37 for a Film Metering Mechanism

Gentlemen:

STAT [redacted] is pleased to submit this proposal B 66-37 for a film metering mechanism for the Contact Duplicating and Reseau Printer (Printer Number 1).

The metering mechanism and the proposed ten-week program is described in detail in the enclosed Technical Proposal. This program is based on the Government making the Printer available for [redacted] pickup three days after the execution of the proposed amendment.

STAT

Acceptance testing of the film metering mechanism will be held at [redacted] at the end of the tenth week, following which the Printer will be delivered, FOB [redacted] to the Government. At this time, [redacted] will also deliver three (3) reproducible copies of sketches and drawings of the modification.

STAT STAT STAT

It is contemplated that the referenced contract will be amended to incorporate the work proposed herein. Our price for this effort is [redacted] including a fixed fee of [redacted] The attached Cost Summary provides supporting detail.

STAT STAT

Declass Review by NGA.

STAT [redacted]

[redacted]

It is anticipated that the negotiated ceilings for overhead and G & A stated in the Schedule of the contract will not be applicable to the effort proposed herein. All other terms and conditions of the contract will remain unchanged.

This proposal will remain firm for a period of sixty (60) days and be subject to change or confirmation thereafter.

Should you have any questions, please do not hesitate to contact our [redacted] Contract Administrator, at [redacted]

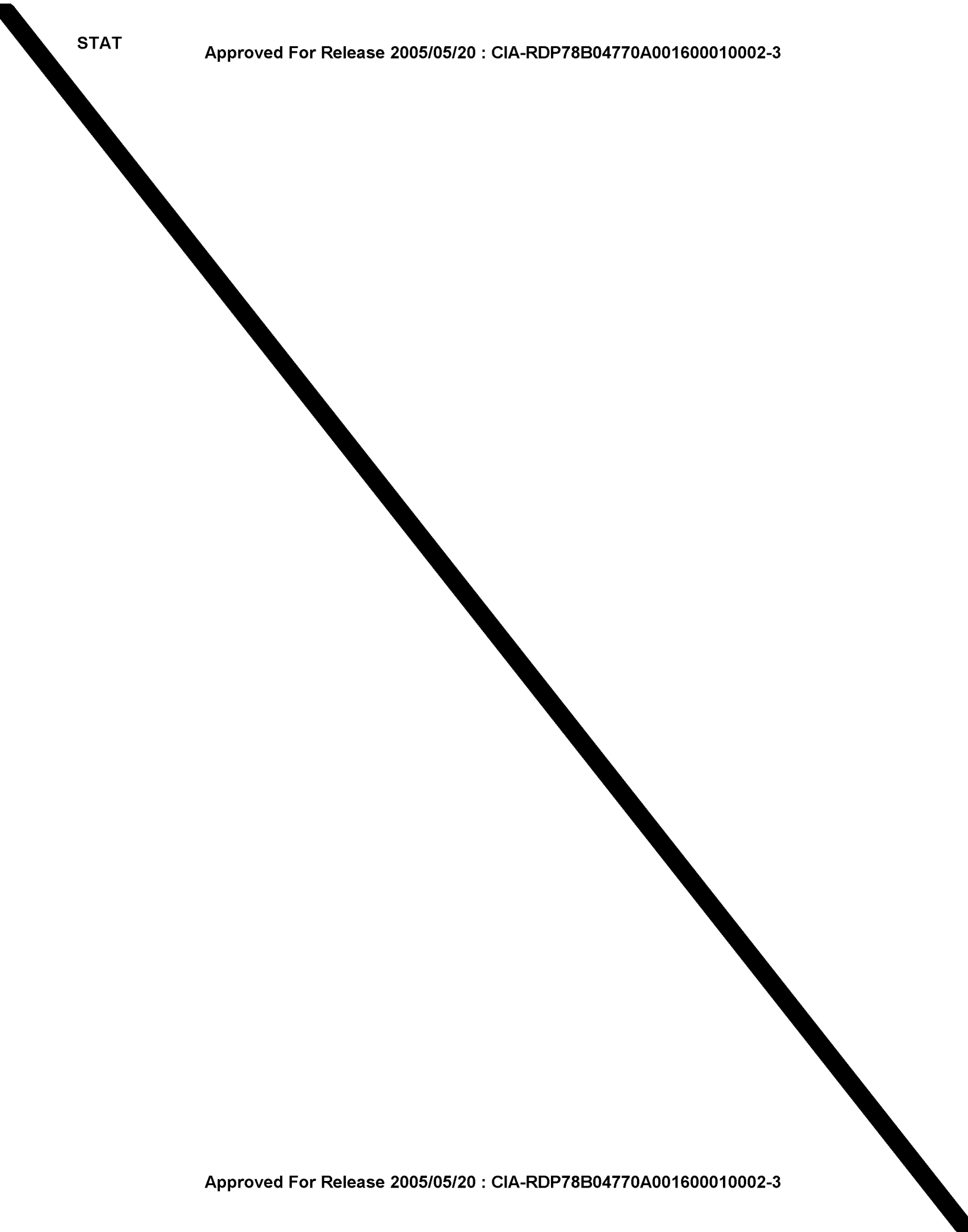
STAT
STAT

Very truly yours,

[redacted]

STAT

RKD:WAK:ks



Approved For Release 2005/05/20 : CIA-RDP78B04770A001600010002-3

PROPOSAL FOR

A Film Metering Mechanism

To

U. S. GOVERNMENT

Submitted by

[redacted]

STAT

Approved For Release 2005/05/20 : CIA-RDP78B04770A001600010002-3

TABLE OF CONTENTS

PROPOSAL FOR A FILM METERING MECHANISM

I. Introduction

STAT [redacted] is pleased to submit the following proposal for a film metering mechanism for the original film transport on the Contact Duplicating and Reseau Printer. The function of the mechanism will be to replace the frame length timer now used to signal the initiation of frame detection. This mechanism will permit selection of the original film frame length to within 0.5 inches or less of the boundary for frame lengths up to 30 inches, independent of variations in the transport speed.

The film metering mechanism will attach to the present transport system and will consist of three major parts:

1. Frame Length Selection Controls
2. Pulse Generator
3. Counter and Control Circuitry.

II. Technical Discussion

The function of the present Frame Length Timer on the Contact Duplicating and Reseau Printer is to program the original film for automatic frame detection, such that the frame boundary detector circuitry is disabled until the boundary is in the proximity of the detector cells. This effectively reduces the probability of detecting "false boundaries" within any frame. After boundary detection, the film, which has been moving at high speed for frames over 10 inches in length, is shifted to slow speed and is precisely metered 5 inches into the printer film gate.

The present system utilizes a precise electronic timer to monitor film metering; hence is subject to the normal speed variations (± 10%) inherent in the original film transport. Therefore, in order to meter the film more precisely to take advantage of films whose boundary separations remain fairly constant throughout the roll,

a system must be evolved that is compatible with this precision. Although a requirement of one inch has been established by the Government as a proximity goal, a metering system resolution of one-quarter inch is the planned objective resulting in a total expected variation of about one-half inch.

Mechanical and electronic metering systems were evaluated and an electronic system has been selected as being most easily adapted to the present configuration. It further has the advantage of being modular in construction, versatile in application, and more reliable than a mechanical system.

The system block diagram is shown in Figure 1, Page 3. Film passing over an existing roller is caused to drive the transducer, which generates a required number of pulses per inch of film travel. The pre-set counter is intially programmed in accordance with the desired frame length by the units and tens switches.

In operation, when the original film transport starts, the pre-set counter will disable the FSD sensing elements and permit the start of film metering. As the film is metered, the counter will keep a tally at the rate of 4 counts per inch of film displacement. At some predetermined point within the film frame, as previously selected by the operator, the counter will reach its predetermined value and cause the detection elements to turn on and look for a frame boundary. Upon finding the boundary, the film is slow-speeded, and permitted to meter 5 inches, so that the frame is positioned into the printer gate. The transport brake is then applied, and a contact closure in the printer will reset the counter to its predetermined value.

III. Component Details

A. Transducer

The transducer must generate pulses compatible with the counter input, and introduce to the driving shaft a minimum of torque, which could cause film slippage and resultant inaccuracies in metering. It should also have long life, preferably be sealed, and require a minimum of maintenance.

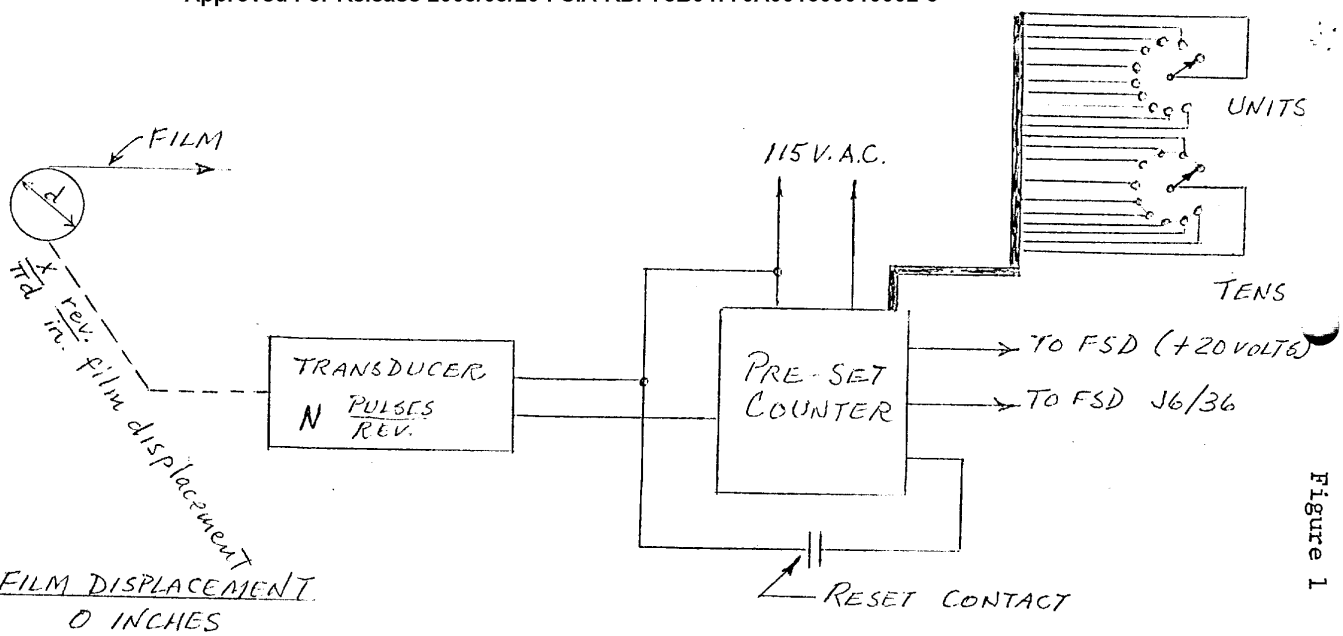


Figure 1

COUNT	FILM DISPLACEMENT
00	0 INCHES
01	1/4
02	1/2
03	3/4
04	1
08	2
12	3
16	4
20	5
40	10
60	15
80	20
99	24 3/4

PROPOSED SYSTEM

A number of transducers have been evaluated in a preliminary investigation, and one unit called a [redacted] Rotoswitch Pulser" manufactured by [redacted] looks very promising (See Appendix "B"). It is available in a solid-state light sensitive semi-conductor model, or a mercury wetted and dry reed type of construction. All contacts are arc surpressed. Life of over a billion operations and torque as low as 0.05 inch ounces are claimed by the manufacturer.

STAT STAT STAT

B. Counter

The counter requirements are based on the computation (See Appendix "A") that indicates the necessity for a two-digit counter with a reliable counting rate of approximately 4000 counts/minute. The counter must be small, preferably have self-contained power, and be compatible with the selected pulses. One counter which meets all of these requirements is manufactured by [redacted] (See Appendix "B"). The final unit would be specially modified to provide the 4000 cpm requirement, and would have the setting switches removed for remote installation.

STAT

C. Controls

The controls, removed from the counter, will consist of two rotary switches, tens and units, and a push-button entry and reset switch. These will preferably be located on or near the present FSD control panel in place of the frame length timer control. However, should there be space limitations, a suitable location, convenient for machine operation, will be selected.

D. Wiring

The proposed system will require a minimum of wiring modification, depending on the final location of the counter and the transducer. Shielded wires will be utilized, where required, to reduce noise susceptability, and current-carrying cables will be compatible with recommended wire sizes.

IV. Test and Calibration

After installation, the film metering mechanism will be tested and calibrated. A calibration chart will be prepared if the dial readings do not read directly in inches.

V. Construction and Mounting

The components of the proposed Film Metering System are basically three in number, as previously described, plus necessary wiring:

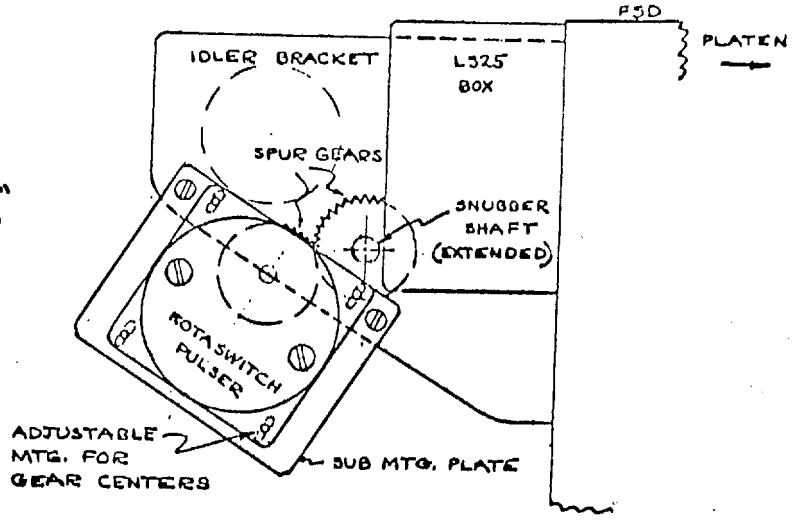
A. The pulse-generating transducer will be mounted on the front left-hand idler bracket of the printing platen. The shaft of the snubber roll will be extended and a spur gear mounted thereon which will drive a similar spur gear on the transducer shaft. Mounting will be on a sub-plate with slotted holes for regulating gear center distance. Having a large degree of film wrap, the snubber roll will accurately reflect film movement to the transducer. See Figure 2, Page 6.

B. The pre-settable counter will be located in the rear of the lower left-hand chassis drawer. Adequate space is available on the chassis drawer just behind the tip-up enclosure which houses existing relays. Bracket mounting will be provided. The counter will roll out with the relay chassis to facilitate maintenance.

C. Controls for setting the counter in accordance with frame length will be removed from the counter and located on a small panel bracket at the left hand end of the printing platen. Knobs will be provided for "units" and "tens", plus a reset push button.

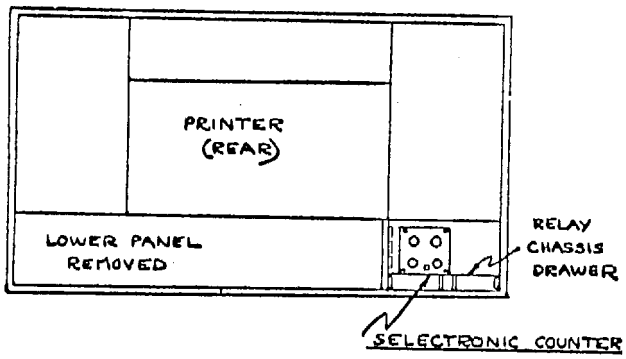
D. Wiring from the Film Metering Control Panel will be led through the rear of the printing platen drawer to the counter and to the Frame Separation Detector. A multi-terminal connector will be located in space now occupied by the Frame Length Timer Knob. Construction and wiring will be in accordance with good commercial standards and components and wiring will not interfere with present functions and accessability.

"A"



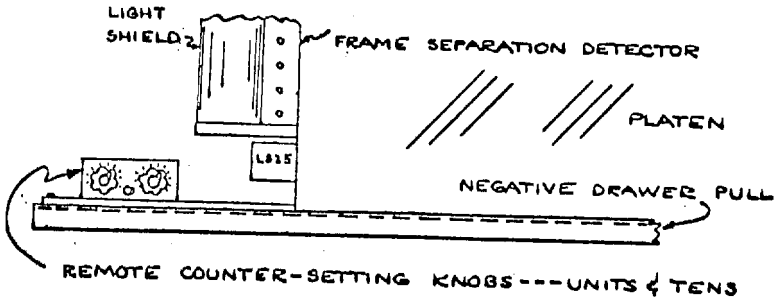
"ROTASWITCH" PULSER UNIT MOUNTED ON IDLER BRACKET, L.H. END OF PLATEN

"B"



"SELECTRONIC" COUNTER MOUNTED IN LOWER RIGHT CORNER OF REAR OF PRINTER

"C"



PROPOSED LOCATION FOR FILM METER CONTROLS

LEFT END OF PLATEN, FRONT

VI. Program Plan

A. Work Statement

STAT [redacted] offers to provide the design and installation of a film metering mechanism for the original film transport on the Contact Duplicating and Reseau Printer. The function of the mechanism will be to replace the frame length timer now used to signal the initiation of frame detection. The mechanism will permit selection of the original film frame length to within 0.5 inches or less of the boundary for frame lengths up to 30 inches, independent of variations in the transport speed. The film metering mechanism will attach to the present transport system and will consist of three major parts:

1. Frame length selection controls
2. Pulse generator
3. Counter and control circuitry

STAT [redacted] offers to perform this work at the [redacted] STAT facility [redacted] and will furnish STAT the manpower and material required in accordance with the attached schedule. Printer shipment STAT from Washington [redacted] STAT to Washington will be provided by [redacted] STAT It should be noted that the schedule requires arrival of the Printer at [redacted] by the beginning of STAT the second week of the program.

B. Deliverable Items

The following items will be delivered to the Government at the end of the tenth week:

1. Printer, Contact Duplicating and Reseau, modified with Film Metering Mechanism.

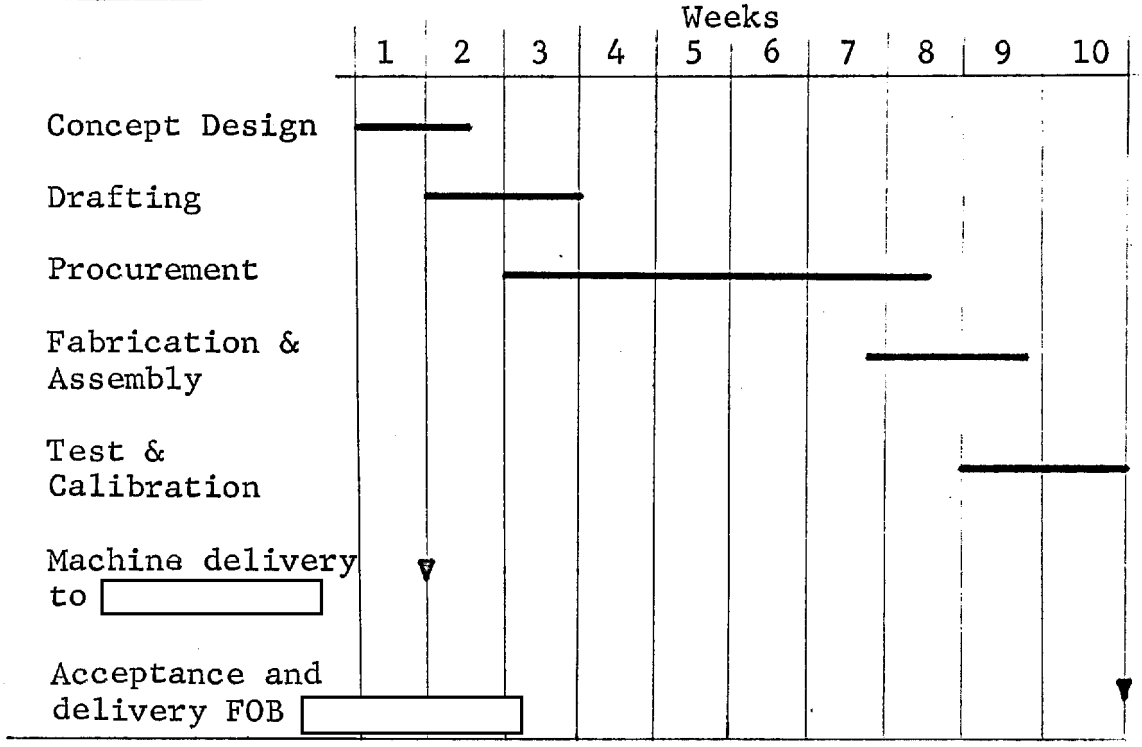
2. Three reproducable copies each of sketches and drawings of modification components.

3. Four each, Charts, calibration, provided if rotary switches do not read directly in inches. Chart will be typewritten on 8½ x 11" sheets and mounted in protective folders.

C. Test Demonstration

Operation of the Film Metering Mechanism will be demonstrated to representatives of the Government during the tenth week of the program. Final acceptance by the Government will be STAT [redacted]

4. Schedule



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VII. APPENDIX

A. Computations

1. Assumptions

a. Pulser and film roller on the same shaft.
b. Maximum film speed of present transport: 13 inches/second.
c. Desired resolution: 1/4 inch.

2. Roller Diameter

Let D = diameter of film drive roller and
N = pulses/revolution of pulser
πD = inches/revolution of roller and pulser
then $\frac{N}{\pi D}$ = 4 pulses/inch; $N = 4\ \pi D$.
For a 20-pulse/revolution pulser, $4\pi D = 20$
and the roller diameter required, D = 1.59 inches.

3. Counter Requirements

For a maximum frame length of 30 inches, the maximum required film displacement prior to boundary sensing will be 30 - 5.25 - 24.75 inches, assuming detector turn-on 0.25 inches before the boundary (See Figure 2, Page 11).

Since the desired resolution is 0.25 inches, then 4 pulses/inch are required, and a maximum total of 24.75 x 4 = 99 pulses will be counted. The counter can, therefore, be a two-digit counter (units and tens).

The maximum film speed being 13 inches/second, will require a counter speed of:

$$\frac{4 \text{ pulses}}{\text{inch}} \times \frac{13 \text{ inches}}{\text{seconds}} \times \frac{60 \text{ seconds}}{\text{minute}} = \frac{3120 \text{ pulses}}{\text{minute}}$$

The manufacturer's counter specification calls for 4000 counts/minute, which is more than adequate.

3. Pulser Requirements

The maximum pulse rate of 3120 pulses/minute is compatible with the Rotoswitch Pulser, whose pulse rate is 6000/minute for the reed switch model and 40,000/minute for the photo-electric model.

The output pulse duration is 50% "On" - 50% "Off" as required by the counter.

B. Manufacturer's Data

See Page 12, et seq.

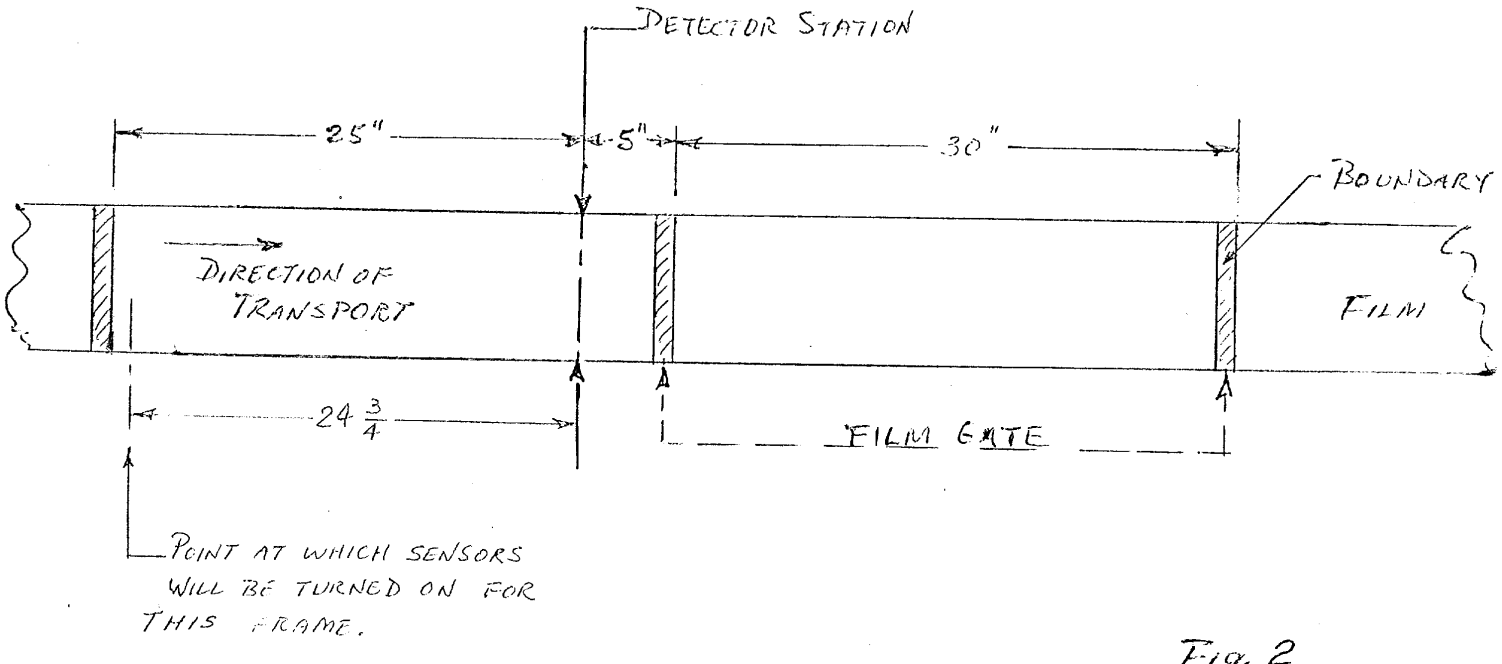


Fig. 2

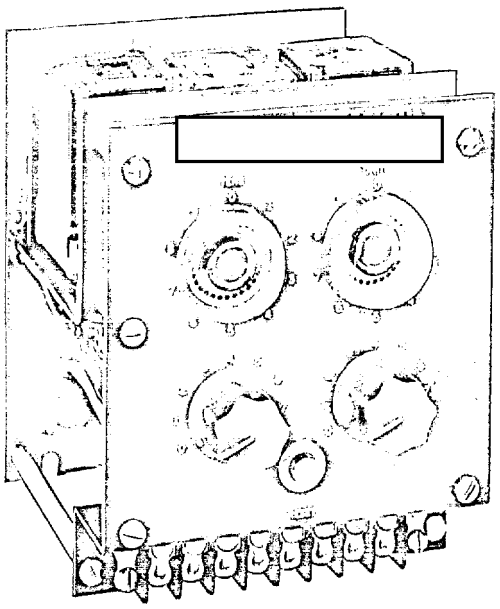
Figure 3

VII. APPENDIX

B. Manufacturers' Data

(See Attached Sheets)

BULLETIN NO. SC-A12-654
Supersedes No. SC-A12-651



Shown with option "A"

SELECTRONIC COUNTER

MODELS SC-A11 and SC-A12

Electronic, presettable, batch counters that count any object or event whose presence or action can be changed into a closure of electrical contacts.

At the end of the preset count, SPDT control contacts operate momentarily and the counter resets itself to zero, continuing to the next batch without loss of count.

Designed for compactness and long-lasting, trouble-free performance, either counter, with its wide range of features, is the perfect control both for use in new installations, and for replacing in existing equipment, the less reliable, less durable, counters of the electromechanical type.

SPECIFICATIONS

(For basic models without optional features)

POWER REQUIREMENTS: 8.5 Watts at 115 Volts, 50/60 Cycles.

AMBIENT TEMPERATURE RANGE: 32° to 122° F. (0° to 50° C.).

PRESETTING RANGE:
1 to 9 Model SC-A11
1 to 99 Model SC-A12

MAXIMUM OPERATING RATE: 2000 counts per minute.

INPUT:
Type: Closure of normally-open contacts or switches (relay or distributor contacts, dry or mercury-wetted reed switches, etc.).
Minimum "on" time: 0.005 second.
Minimum "off" time: 0.025 second.
Rating: 0.006 ampere at 36 VDC (0.22 Watt).

CONTROL CONTACTS: (Plug-in Relay)
Type: SPDT
Rating: 10 Amperes at 120 VAC resistive load.
5 Amperes at 240 VAC resistive load.
10 Amperes at 28 VDC resistive load.
Operate time: Contacts are fully transferred 0.015 second after the preset count is reached.
Operated time: Contacts remain transferred 0.1 second ± 15%.
Repeat accuracy: 5% over the entire temperature and voltage range.

TYPICAL RELAY LIFE:
500,000 operations at 10 Amperes, 120 VAC.
500,000 operations at 5 Amperes, 240 VAC.
3,000,000 operations at 5 Amperes, 120 VAC.
5,000,000 operations at 3 Amperes, 120 VAC.
10,000,000 operations at 1 Ampere, 28 VDC.

RESET:
Automatic: The counter resets to zero 0.015 second after the preset count is reached.
Local: The counter can be reset by pressing the reset button on the front panel.
Remote: The counter can be reset by means of a remotely located switch connected to the terminal block. The switch must be of the normally-open, momentary type rated for 0.001 Ampere at 150 VDC or higher.
Minimum "off" time: 0.02 second.
Minimum "on" time: 0.001 second.

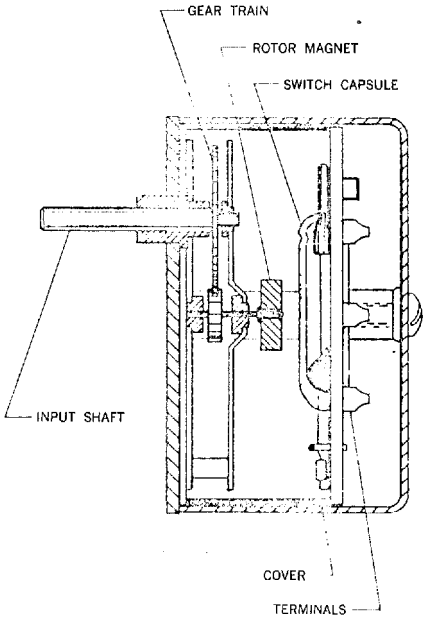
MOUNTING POSITION: Vertical. Maximum tilt angle in any direction: 30°

DIMENSIONS: 5-7/16 high, 4-3/8 wide, 4-3/4 deep.

SHIPPING WEIGHT: 5 lbs.
7 lbs. with enclosure (optional feature "C").

STAT

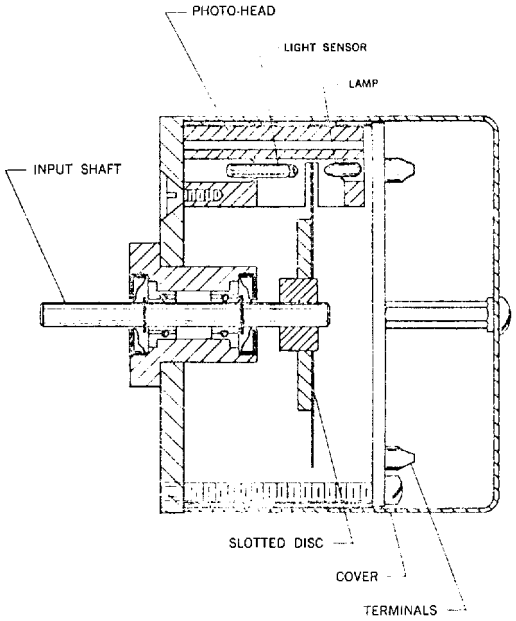
THE [redacted] ROTASWITCH® PULSER FOR DRIVING COUNTERS AND PRINTERS (electronic and electromechanical add only / add and subtract) STEPPING MOTORS (mono-directional / bi-directional)



MERCURY WETTED AND DRY REED TYPE

Rotation of the input shaft rotates the permanent magnet through the gear train. Each revolution of the magnet causes the contacts within a replaceable sealed glass capsule to "make" and "break." Magnet can actuate contacts within one or two glass capsules. Two types of contacts are available: mercury wetted for high power handling capabilities, no contact bounce and long life; and, dry reed for high contact speeds and use in any position. The cover is removable for access to the terminals.

A direction sensitive version includes a slip clutch (on the same shaft as the rotating magnet), a small permanent magnet (driven by the slip clutch), and two glass capsules. At a reversal of the input shaft the small magnet moves through an arc of about 45° causing one or the other set of contacts to become inoperative.

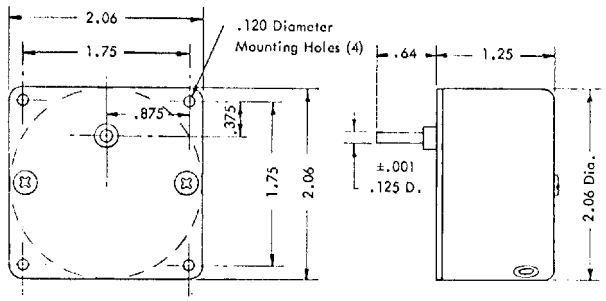


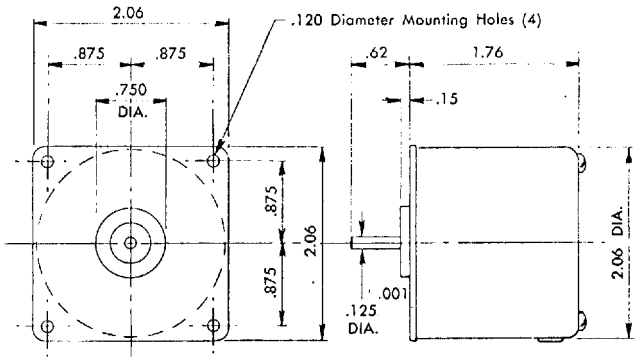
PHOTOELECTRIC TYPE

Rotation of the ball bearing mounted input shaft rotates the slotted metal disc which varies the intensity of the light from the lamps which falls on a semiconductor light sensor. The lamp and the sensor are contained in a replaceable photo-head. Up to three photo-heads can be actuated from the one disc. The cover is removable for access to terminals.

A direction sensitive version includes a slip clutch on the input shaft, two shutters, and two photo-heads. At a reversal of input shaft rotation the slip clutch rotates the shutter about 1° which is sufficient to block the light from the lamps to one or the other light sensor.

A bi-directional version includes two or three photo-heads which are positioned so as to generate out of phase wave forms. A change in direction of rotation reverses the phase relationship for phase sensitive devices such as stepping motors, bi-directional electronic counters, etc.





MODEL 10

Type Contacts.....One set of mercury wetted SPDT "break" before "make"

Contact Rating.....100 volt amperes not to exceed 500 volts or 2 amperes

Pulses Per Minute.....Zero to 6,000

Pulses Per Revolution (Input Shaft).....1, 2, 3, 4, 5, 10, 20, 25, 30, 40, 50, 60, 100, 120, 250, 360 (specify)

Pulse Duration.....50% "on"—50% "off" within ±10% for either direction of input shaft rotation

Torque—(inch ounces).....Multiply .006 by pulses per revolution of input shaft

Life.....Over 1 billion operations at maximum rating (extended life on lower loads)

Mounting Position.....Glass capsule must be vertical within 30°

MODEL 11

Mounting Position.....Input shaft up or down

Dimensions.....Length of cover is 2-15/32"

(All other specifications same as for Model 10)

MODEL 12

Type Contacts.....Two independent sets of mercury wetted SPDT "break" before "make" contacts

(All other specifications same as for Model 10)

MODEL 20

Direction Sensitive.....One set of contacts operate for a clockwise rotation of input shaft—the other for a counterclockwise rotation. At reversal the inoperative contacts remain or return to same pole

Torque—(inch ounces).....Multiply .02 by pulses per revolution of input shaft

(All other specifications same as for Model 12)

MODEL 110

Type Contacts.....One set of dry reed SPST

Contact Rating.....12 volt amperes not to exceed 250 volts or 0.25 amperes

Pulses Per Minute.....Zero to 12,000

Life.....Over 5 million pulses if operated within rating (extended life at lower loads)

Mounting Position.....Any

(All other specifications same as for Model 10)

MODEL 810-1

Output.....2 milliamps "on" (min.) into a 2 K ohm load; .025 microamps "off" (max.)

Input.....12 volts DC, 70 milliamps

Pulse Per Second.....Zero to 40,000

Pulses Per Revolution.....1, 10, 100, 200, 360 (specify)

Torque.....Less than .01 inch ounces

Speed.....10,000 rpm maximum

Lamp Life.....60,000 hours average

MODEL 811-1

Output.....A square wave from +3 volts to +10 volts into a 1 K ohm load. Rise time less than 1 microsecond. The squaring circuit is built into terminal board

(All other specifications same as for Model 810-1)

MODEL 811-2

Output.....Square wave potential varies from −3 to −10 volts

(All other specifications same as for Model 810-1)

MODEL 820

Direction Sensitive.....Includes two photo-heads. One or the other photo-head remains at or shifts to the "off" state at reversal of input shaft rotation

Torque.....Less than .05 inch ounces

(All other specifications same as for Model 810-1)

MODEL 830

Direction Sensitive.....Includes two photo-heads. In operation, wave form from one photo-head leads or lags the other by 90° depending upon direction of input shaft rotation

Pulses Per Revolution.....4, 12, 20, 36, 60, 100, 180, 200 (Specify) (All other specifications same as for Model 810-1)

MODEL 840

Direction Sensitive.....Includes three photo-heads. In operation wave forms lead or lag by 120° depending upon direction of input shaft rotation

Pulses Per Revolution.....3, 6, 12, 75 (specify)

(All other specifications same as for Model 810-1)

STAT

TO ORDER Specify model number ▪ Specify pulses per revolution of input shaft ▪ State special requirements if not covered by above specifications ▪ Application data bulletins available ▪ Bulletin 11 provides engineering information

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